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## PATENT ABSTRACTS OF JAPAN

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## (54) ALKALINE BATTERY

## (57)Abstract:

PROBLEM TO BE SOLVED: To provide an alkaline battery with excellent characteristics suitable for high load or high capacity applications such as various portable AV appliances.

SOLUTION: A metal can used as a terminal and container of an alkaline battery is formed in such a way that a nickel plated layer 12 is formed on one surface of a cold rolled steel plate 11, a nickel-tin alloy plated layer 13 is formed thereon, and a nickel plated layer 10 is formed on the other surface, then the cold rolled steel plate 11 plated like this is formed into a container by drawing so as to face the nickel-tin alloy plated layer 13 inward, and a conductive film 14 mainly comprising graphite is formed on the nickel-tin alloy plated layer 13 on the inside of the container.



## LEGAL STATUS

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the alkaline cell which added improvement to the positive-electrode container which served as the terminal, and raised the super-heavy-loading property etc.

[0002]

[Description of the Prior Art] After the positive-electrode container of the conventional alkaline cell carried out press working of sheet metal of what performed nickel plating to both sides of a steel plate beforehand or carried out spinning of the steel plate, it performed nickel plating, and it was using the thing in which the electric conduction film which makes a graphite a principal component was formed for the inside after an appropriate time, respectively.

[0003] Among these, since a crack arises on a nickel front face by press working of sheet metal and iron natural complexion is exposed when press working of sheet metal is carried out, after performing nickel plating to the former, i.e., a steel plate, beforehand, the surface area of the part nickel plating decreases, therefore contact resistance goes up. If \*\*\*\* of plating by the side of a container inside is bad, for example, performs nickel plating to a superficies side by the thickness of 3 micrometers on the other hand when carrying out nickel plating, after carrying out spinning of the latter, i.e., the steel plate, an inside side will serve as thickness of about 0.5 micrometers. for this reason, a positive electrode -- contact to a mixture becomes bad, and it becomes high and becomes the fall of a short-circuit current, and by the long term storage, contact resistance causes degradation of a performance and also increases the yield of hydrogen gas

[0004]

[Problem(s) to be Solved by the Invention] Although the electric conduction film which makes a graphite a principal component was formed in the positive-electrode container inside as described above in order to solve such a trouble, like portable AV equipments, such as a notebook sized personal computer, a CD player, MD player, and a liquid crystal television, and the cellular phone, the use of super-heavy loading and heavy loading is demanded of the alkaline cell, and became inadequate [ the above-mentioned method ] to these uses in recent years. moreover, a high-capacity-izing sake -- a positive electrode -- a mixture -- the case where made the rate of addition of an inner graphite into 8% or less, and the quantity of manganese dioxide of a positive-electrode active substance is increased -- a can inside and a positive electrode -- since the contact resistance with a mixture became high, it turns out also to this that further it is improved

[0005] It aims at offering the alkaline cell which this invention coped with the above-mentioned situation, was made, and has the property which was excellent to high-capacity-izing as opposed to the use of super-heavy loading and heavy loading, and was excellent also in the storage property.

[0006]

[Means for Solving the Problem] this invention attains the above-mentioned purpose by adding improvement to a terminal-cum-the container of an alkaline cell. namely, this invention Consider as a terminal-cum-the container which inner-\*\* a power generation element, and a nickel-plating layer and a nickel-tin alloy deposit are given to one field one by one. It is related with the alkaline cell which carries out drawing processing of the cold-rolled-steel-plate material which gave the nickel-plating layer to the field of another side so that the former field may turn into an inside, and is characterized by using the can which next comes to form the electric conduction film which makes a graphite a principal component on the nickel-tin alloy deposit of an inside.

[0007] since nickel-tin alloy plating is further given to the side which becomes the container inside of cold-

rolled-steel-plate material on it with nickel plating in this invention -- very much -- a stiff deposit -- becoming --  
 \*\*\*\* -- the time of drawing processing -- a surface nickel-tin alloy deposit -- a stiff sake -- a crack -- being  
 generated -- an uneven side -- forming -- a positive electrode -- it contributes to the improvement in contact  
 with a mixture Moreover, since a nickel-plating layer is under the nickel-tin alloy deposit which cracked, iron  
 natural complexion is not exposed. Therefore, greatly, with a bird clapper, there is no contact resistance and it  
 can aim at improvement in a short-circuit current.

[0008] By this invention, although tin dissolves and the fall of open circuit voltage and generating of hydrogen  
 gas take place when the nickel-tin alloy deposit is directly in contact with the electrolytic solution, since the  
 electric conduction film which makes a graphite a principal component is formed on the nickel-tin alloy deposit,  
 this can be prevented and a short-circuit current improves further.

[0009]

[Embodiments of the Invention] The operation gestalt of this invention is explained with reference to a drawing.  
Drawing 1 is the cross section of the alkaline cell (JISLR6 type (single 3 type)) in which one example of this  
 invention is shown. the metal can of the closed-end cylindrical shape to which 1 serves as a positive-electrode  
 terminal in this drawing, and 2 -- a positive electrode -- a mixture and 3 -- for a negative-electrode current  
 collection rod and 6, as for a ring-like metal plate and 8, an insulating gasket and 7 are [ separator and 4 / a gel  
 negative electrode and 5 / a metal obturation board and 9 ] label jackets

[0010] Drawing 2 shows the cross-section structure of the metal can 1 of the closed-end cylindrical shape which  
 serves as the positive-electrode terminal in drawing 1, and ten in drawing is an electric conduction membrane  
 layer to which in a steel plate and 12 a nickel-plating layer and 13 make a graphite as a nickel-tin alloy deposit,  
 and 14 makes [ a nickel-plating layer and 11 ] it a principal component. As shown in drawing 2, the electric  
 conduction membrane layer 14 to which the nickel-plating layer 10 is formed in the superficies side of a steel  
 plate 11, and a metal can 1 makes a principal component the nickel-plating layer 12, the nickel-tin alloy deposit  
 13, and a graphite at an inside side is formed.

[0011] A metal can 1 is manufactured as follows. That is, drawing processing of what carried out plating  
 processing at the steel plate 11 is carried out at the cylindrical shape of an owner bottom. Plating performs  
nickel plating to a metal-can inside base side 1-2 micrometers in thickness, and gives 1-2 micrometers of nickel-  
 tin alloy plating on it. 2-3 micrometers of nickel plating are performed to a metal-can superficies base side.  
 After carrying out drawing processing of this at a metal can, the electric conduction film which makes a  
 graphite a principal component is formed in a metal-can inside (portion except the part which touches the gasket  
 of opening).

[0012] The method of application of an electric conduction film dilutes the conductive coating material which  
 makes a graphite a principal component with low-boiling point organic solvents, such as a methyl ethyl ketone  
 (MEK), and applies it to a metal-can inside in the shape of a fog with a spray gun. It is made not to apply to the  
 portion which touches the gasket of opening then. A solvent is evaporated with a dryer after an application. The  
 thickness of the remaining electric conduction film has desirable 1-10 micrometers.

[0013] the positive electrode which carried out pressing to the shape of a cylinder into this metal can 1 -- it fills  
 up with the mixture 2 a positive electrode -- a mixture 2 mixes the manganese dioxide powder and a graphite  
 powder, holds this in a metal can 1, and it carries out pressing to the shape of a hollow cylinder by the  
 predetermined pressure a high-capacity-izing of service capacity sake -- a positive electrode -- the rate of  
 graphite addition in a mixture 2 was made into 8% (rate of graphite addition = [a graphite-powder weight] / [a  
 manganese dioxide weight + graphite-powder weight])

[0014] moreover, a positive electrode -- the centrum of a mixture 2 is filled up with the gel negative electrode 4  
 through the separator 3 of the shape of a closed-end cylinder which consists of a nonwoven fabric of 10% of  
 vinylons 30% [ of Vinylon fiber ], 30% [ of rayon fiber ], and mercerization pulp 30% In the gel negative  
 electrode 4, the negative-electrode current collection rod 5 made from brass is inserted so that the upper-limit  
 section may be projected from the gel negative electrode 4. The insulating gasket 6 which becomes the lobe  
 peripheral face of the negative-electrode current collection rod 5 and the up inner skin of a metal can 1 from  
 double annular polyamide resin is arranged. Moreover, the ring-like metal plate 7 is arranged between the  
 double annular sections of an insulating gasket 6, and it is arranged by the metal plate 7 so that the metal  
 obturation board 8 of a hat form which serves as a negative-electrode terminal may contact the head of the  
 current collection rod 5. And by making the opening edge of a metal can 1 crooked in the inner direction, the  
 seal mouth of the inside of a metal can 1 is carried out with the gasket 6 and the metal obturation board 8.

[0015] In order to compare with the example of the above-mentioned this invention, the alkaline cell shown in the following examples of comparison was assembled. All are the JIS LR6 type (single 3 type) alkaline cells of the same structure except metal-can 1.

[0016] (Example 1 of comparison) What considered as a terminal-cum-the container which inner-\*\* a power generation element, carried out drawing processing and used as the can what gave the nickel-tin alloy deposit to the inside side of cold-rolled-steel-plate material a nickel-plating layer and on it, and gave the nickel-plating layer to the superficies side was used.

[0017] (Example 2 of comparison) It considered as a terminal-cum-the container which inner-\*\* a power generation element, and drawing processing was carried out, what gave the nickel-plating layer to the inside side of cold-rolled-steel-plate material, and gave the nickel-plating layer to the superficies side was used as the can, and the thing in which the electric conduction film which makes a graphite a principal component was formed was used for the can inside.

[0018] (Example 3 of comparison) After having considered as a terminal-cum-the container which inner-\*\* a power generation element, carrying out drawing processing of the cold-rolled-steel-plate material and considering as a can, nickel plating was performed to the inside-and-outside both sides, and the thing in which the electric conduction film which makes a graphite a principal component further was formed was used for the inside.

[0019] the open circuit voltage (n= 100 averages) after storing for ten days and for 60 days at 60 degrees C about each above-mentioned alkaline cell -- it wore the short-circuit current (n= 100 averages), and the amount of hydrogen gas (n= 100 averages) was investigated The amount of hydrogen gas disassembled the cell underwater, carried out the uptake of the gas inside a cell, and measured it. A result is shown in Table 1.

[0020]

[Table 1]

	開路電圧 (V)		短絡電流 (A)		水素ガス量 (CC)	
	10日後	60日後	10日後	60日後	10日後	60日後
60℃貯蔵						
実施例	1.610	1.592	13.9	12.5	0.34	0.57
比較例 1	1.610	1.581	9.7	8.6	0.36	1.92
比較例 2	1.610	1.592	11.2	10.5	0.35	0.63
比較例 3	1.610	1.591	11.1	10.3	0.33	0.70

[0021] If an example 1 is compared with the example 1 of comparison as shown in Table 1, a remarkable difference will be accepted in degradation of open circuit voltage by storage for 60-degree-C 60 days, and a remarkable difference will be accepted also in the amount of hydrogen gas after storage for 60-degree-C 60 days. Moreover, a difference remarkable also about a short-circuit current is seen. Therefore, the effect of having formed the electric conduction film in the inside of a can in this invention can be checked. Moreover, if an example 1, the example 2 of comparison, and each example 3 are compared, improvement in the short-circuit current by the nickel-tin alloy deposit can be checked.

[0022]

[Effect of the Invention] As explained above, this invention can offer the alkaline cell which was excellent in the high capacity property and the high heavy-loading property, and was excellent also in the storage property by improving a terminal-cum-the container which inner-\*\* a power generation element.

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CLAIMS

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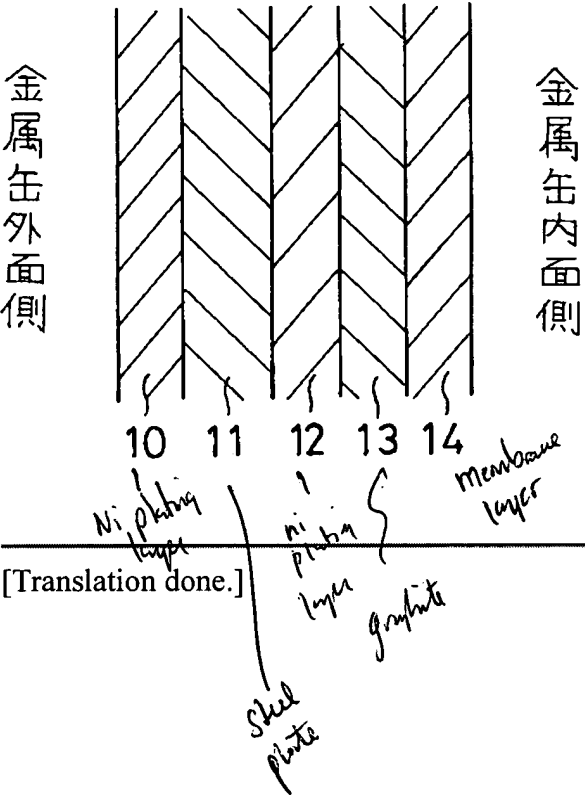
[Claim(s)]

[Claim 1] The alkaline cell which considers as a terminal-cum-the container which inner-\*\* a power generation element, carries out drawing processing of the cold-rolled-steel-plate material which gave the nickel-plating layer and the nickel-tin alloy deposit to one field one by one, and gave the nickel-plating layer to the field of another side so that the former field may turn into an inside, and is characterized by to use the can which next comes to form the electric-conduction film which makes a graphite a principal component on the nickel-tin alloy deposit of an inside.

[Claim 2] the positive electrode which is a power-generation element -- a mixture -- the alkaline cell according to claim 1 whose inner rate of graphite addition is 8% or less

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[Translation done.]



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WEST

## End of Result Set



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L20: Entry 2 of 2

File: JPAB

Jan 16, 1998

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TITLE: ALKALINE BATTERY

PUBN-DATE: January 16, 1998

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APPL-NO: JP08161602

APPL-DATE: June 21, 1996

INT-CL (IPC): H01 M 2/02; H01 M 4/06

## ABSTRACT:

PROBLEM TO BE SOLVED: To provide an alkaline battery with excellent characteristics suitable for high load or high capacity applications such as various portable AV appliances.

SOLUTION: A metal can used as a terminal and container of an alkaline battery is formed in such a way that a nickel plated layer 12 is formed on one surface of a cold rolled steel plate 11, a nickel-tin alloy plated layer 13 is formed thereon, and a nickel plated layer 10 is formed on the other surface, then the cold rolled steel plate 11 plated like this is formed into a container by drawing so as to face the nickel-tin alloy plated layer 13 inward, and a conductive film 14 mainly comprising graphite is formed on the nickel-tin alloy plated layer 13 on the inside of the container.

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L18: Entry 4 of 4

File: DWPI

Jan 16, 1998

DERWENT-ACC-NO: 1998-136095

DERWENT-WEEK: 199813

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TITLE: Alkaline cell for portable audio/video equipment - has electrically conductive film with graphite as principal component, is formed at nickel tin alloy layer of steel plate

PATENT-ASSIGNEE:

ASSIGNEE

TOSHIBA BATTERY CO LTD

CODE

RAYN

PRIORITY-DATA: 1996JP-0161602 (June 21, 1996)

PATENT-FAMILY:

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INT-CL (IPC): H01 M 2/02; H01 M 4/06

ABSTRACTED-PUB-NO: JP 10012199A

BASIC-ABSTRACT:

The cell has a metal vessel type electrode terminal comprising of a cold rolled steel plate (11). A nickel content first layer (12) and a nickel tin alloy layer (13) are formed at one surface of the steel plate, sequentially. The sequential layer formation is at the inner surface and a nickel content second layer (10) is formed at the other surface of the steel plate. An electrically conductive film (14) with graphite as the principal component, is formed at the alloy layer.

ADVANTAGE - Improves storage capacitance characteristics. Increases loading characteristics, with terminal-type-vessel component.

CHOSEN-DRAWING: Dwg.2/2

TITLE-TERMS: ALKALINE CELL PORTABLE AUDIO VIDEO EQUIPMENT ELECTRIC CONDUCTING FILM GRAPHITE PRINCIPAL COMPONENT FORMING NICKEL TIN ALLOY LAYER STEEL PLATE

DERWENT-CLASS: L03 X16

CPI-CODES: L03-E01B4;

EPI-CODES: X16-A01A; X16-E03; X16-F01; X16-F03A;

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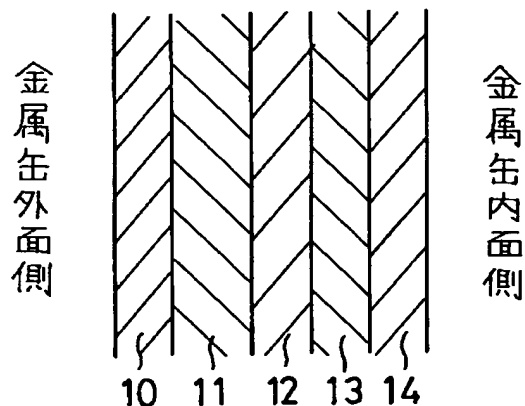
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(54)【発明の名称】 アルカリ電池

(57)【要約】

【目的】近年の種々な携帯用A V機器のような重負荷の用途または高容量化に対しても、特性の優れたアルカリ電池を提供すること。

【構成】アルカリ電池の端子兼容器として使用される金属缶に特徴を有するもので、金属缶は次のように製造したものを使用する。冷間圧延鋼板材の一方の面にニッケルメッキ層およびその上にニッケル—スズ合金メッキ層を施し、他方の面にニッケルメッキ層を施し、このようにメッキした冷間圧延鋼板材を、前者の面が内面になるようにプレス絞り加工して容器とし、次にこの容器内面のニッケル—スズ合金メッキ層の上に黒鉛を主成分とする導電膜を形成する。



## 【特許請求の範囲】

【請求項1】 発電要素を内填する端子兼容器として、一方の面にニッケルメッキ層およびニッケルスズ合金メッキ層を順次施し、他方の面にニッケルメッキ層を施した冷間圧延鋼板材を、前者の面が内面になるようにプレス絞り加工し、次に内面のニッケルスズ合金メッキ層の上に黒鉛を主成分とする導電膜を形成してなる缶を用いたことを特徴とするアルカリ電池。

【請求項2】 発電要素である正極合剤中の黒鉛添加率が8%以下である請求項1記載のアルカリ電池。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、端子を兼ねた正極容器に改良を加えて超重負荷特性等を向上させたアルカリ電池に関する。

## 【0002】

【従来の技術】従来のアルカリ電池の正極容器は、鋼板の両面に予めニッケルメッキを施したものをプレス加工するか、または鋼板を絞り加工した後ニッケルメッキを施し、しかる後それぞれ内面に黒鉛を主成分とする導電膜を形成したものを使用していた。

【0003】このうち、前者すなわち、鋼板に予めニッケルメッキを施してからプレス加工した場合は、プレス加工によりニッケル表面にひび割れが生じて鉄の地肌が露出するので、その分ニッケルメッキの表面積が少なくなり、そのため接触抵抗が上昇する。一方、後者すなわち、鋼板を絞り加工してからニッケルメッキする場合は、容器内面側のメッキのつきが悪く、例えば外面側に3 $\mu$ mの厚さでニッケルメッキを施すと内面側は0.5 $\mu$ m程度の厚さとなる。このため、正極合剤との接触が悪くなり、接触抵抗が高くなって短絡電流の低下となり、長期貯蔵では性能の劣化を招いて水素ガスの発生量も増加する。

## 【0004】

【発明が解決しようとする課題】このような問題点を解決するために、前記したように正極容器内面には黒鉛を主成分とする導電膜が形成されているが、近年、ノート型パソコン、CDプレーヤ、MDプレーヤ、液晶テレビ等の携帯用AV機器、携帯電話などのように、超重負荷、重負荷の用途がアルカリ電池に要求されており、これらの用途に対しては上記の方法では不十分となった。また、高容量化のために正極合剤中の黒鉛の添加率を8%以下とし、正極作用物質の二酸化マンガンを増量した場合には、缶内面と正極合剤との接触抵抗が高くなるので、これに対してもさらなる改善が必要であることがわかった。

【0005】本発明は上記状況に対処してなされたもので、超重負荷、重負荷の用途に対し、または高容量化に対して優れた特性を有し、また貯蔵特性にも優れたアルカリ電池を提供することを目的としたものである。

## 【0006】

【課題を解決するための手段】本発明は、アルカリ電池の端子兼容器に改良を加えることによって上記目的を達成したものであって、すなわち本発明は、発電要素を内填する端子兼容器として、一方の面にニッケルメッキ層およびニッケルスズ合金メッキ層を順次施し、他方の面にニッケルメッキ層を施した冷間圧延鋼板材を、前者の面が内面になるようにプレス絞り加工し、次に内面のニッケルスズ合金メッキ層の上に黒鉛を主成分とする導電膜を形成してなる缶を用いたことを特徴とするアルカリ電池に関する。

【0007】本発明では、冷間圧延鋼板材の容器内面になる側にニッケルメッキとその上にさらにニッケルスズ合金メッキを施してあるので、非常に硬いメッキ層となっており、プレス絞り加工時は表面のニッケルスズ合金メッキ層が硬いためにひび割れを生じ、凸凹面を形成して正極合剤との接触向上に寄与する。また、ひび割れたニッケルスズ合金メッキ層の下にはニッケルメッキ層があるので、鉄の地肌は露出しない。したがって、接触抵抗が大きくなることはなく、短絡電流の向上を図ることができる。

【0008】ニッケルスズ合金メッキ層が電解液に直接接している場合にはスズが溶解して開路電圧の低下と水素ガスの発生が起こるが、本発明ではニッケルスズ合金メッキ層の上に黒鉛を主成分とする導電膜が形成されているので、これを防ぐことができ、短絡電流がさらに向上する。

## 【0009】

【発明の実施の形態】本発明の実施形態を図面を参照して説明する。図1は本発明の一実施例を示すアルカリ電池（JIS規格LR6形（単3形））の断面図である。この図において、1は正極端子を兼ねる有底円筒形の金属缶、2は正極合剤、3はセパレータ、4はゲル状負極、5は負極集電棒、6は絶縁ガスケット、7はリング状金属板、8は金属封口板、9はラベルジャケットである。

【0010】図2は図1における正極端子を兼ねる有底円筒形の金属缶1の断面構造を示すもので、図中10はニッケルメッキ層、11は鋼板、12はニッケルメッキ層、13はニッケルスズ合金メッキ層、14は黒鉛を主成分とする導電膜層である。図2に示すように、金属缶1は、鋼板11の外面側にニッケルメッキ層10が形成され、内面側にニッケルメッキ層12、ニッケルスズ合金メッキ層13および黒鉛を主成分とする導電膜層14が形成されている。

【0011】金属缶1は次のようにして製作する。すなわち、鋼板11にメッキ加工したものを有底の円筒形にプレス絞り加工する。メッキは金属缶内面素地側にニッケルメッキを厚さ1～2 $\mu$ m施し、その上にニッケルスズ合金メッキを1～2 $\mu$ m施す。金属缶外面素地側に

はニッケルメッキを2〜3 $\mu$ m施す。これを金属缶にプレス絞り加工した後、金属缶内面（開口部のガスケットと接する箇所を除いた部分）に、黒鉛を主成分とする導電膜を形成する。

【0012】導電膜の塗布方法は、黒鉛を主成分とする導電塗料をメチルエチルケトン（MEK）等の低沸点有機溶媒で希釈し、スプレーガンにより霧状に金属缶内面に塗布する。その時開口部のガスケットと接する部分には塗布しないようにする。塗布後、乾燥機で溶剤を蒸発させる。残った導電膜の厚さは1〜10 $\mu$ mが望ましい。

【0013】この金属缶1内には、円筒状に加圧成形した正極合剤2が充填されている。正極合剤2は、二酸化マンガン粉末と黒鉛粉末とを混合し、これを金属缶1内に収容し、所定の圧力で中空円筒状に加圧成形したものである。放電容量の高容量化のために、正極合剤2中の黒鉛添加率は8%とした（黒鉛添加率＝〔黒鉛粉末重量〕／〔二酸化マンガン重量＋黒鉛粉末重量〕）。

【0014】また、正極合剤2の中空部には、ビニロン繊維30%、レーヨン繊維30%、マーセル化パルプ30%、ポリビニルアルコール繊維10%の不織布からなる有底円筒状のセパレータ3を介してゲル状負極4が充填されている。ゲル状負極4内には真鍮製の負極集電棒5が、その上端部をゲル状負極4より突出するように挿着されている。負極集電棒5の突出部外周面および金属缶1の上部内周面には二重環状のポリアミド樹脂からなる絶縁ガスケット6が配設されている。また、絶縁ガスケット6の二重環状部の間にはリング状の金属板7が配設され、かつ金属板7には負極端子を兼ねる帽子形の金属封口板8が集電棒5の頭部に当接するように配設されている。\*30

\*そして金属缶1の開口縁を内方に屈曲させることにより、ガスケット6および金属封口板8で金属缶1内を密封している。

【0015】上記した本発明の実施例と比較するために、以下の比較例に示すアルカリ電池を組み立てた。いずれも金属缶1以外は同じ構造のJIS規格LR6形（単3形）アルカリ電池である。

【0016】（比較例1）発電要素を内填する端子兼容器として、冷間圧延鋼板材の内面側にニッケルメッキ層とその上にニッケル―スズ合金メッキ層を施し、外面側にニッケルメッキ層を施したものを、プレス絞り加工して缶としたものを用いた。

【0017】（比較例2）発電要素を内填する端子兼容器として、冷間圧延鋼板材の内面側にニッケルメッキ層を施し、外面側にニッケルメッキ層を施したものを、プレス絞り加工して缶とし、その缶内面に黒鉛を主成分とする導電膜を形成したものを用いた。

【0018】（比較例3）発電要素を内填する端子兼容器として、冷間圧延鋼板材をプレス絞り加工して缶とした後、その内外両面にニッケルメッキを施し、内面にさらに黒鉛を主成分とする導電膜を形成したものを用いた。

【0019】上記の各アルカリ電池について、60℃で10日間および60日間貯蔵した後の、開路電圧（ $n=100$ 個の平均値）、短絡電流（ $n=100$ 個の平均値）および水素ガス量（ $n=100$ 個の平均値）を調べた。水素ガス量は電池を水中で分解し、電池内部のガスを捕集して測定した。結果を表1に示す。

【0020】

【表1】

	開路電圧 (V)		短絡電流 (A)		水素ガス量 (CC)	
	10日後	60日後	10日後	60日後	10日後	60日後
実施例	1.610	1.592	13.9	12.5	0.34	0.57
比較例1	1.610	1.581	9.7	8.6	0.36	1.92
比較例2	1.610	1.592	11.2	10.5	0.35	0.63
比較例3	1.610	1.591	11.1	10.3	0.33	0.70

【0021】表1に示されるように、実施例1と比較例1とを比較すると、60℃60日貯蔵で、開路電圧の劣化に著しい差が認められ、また60℃60日貯蔵後の水素ガス量にも著しい差が認められる。また、短絡電流についても著しい差が見られる。したがって、本発明において缶の内面に導電膜を形成したことの効果が確認できる。また、実施例1と比較例2および各例3を比較すると、ニッケル―スズ合金メッキ層による短絡電流の向上が確認できる。

【0022】

【発明の効果】以上説明したように、本発明は発電要素※50

40※を内填する端子兼容器を改良することによって、高容量特性、高重負荷特性に優れ、また貯蔵特性にも優れたアルカリ電池を提供することができる。

【図面の簡単な説明】

【図1】本発明の実施例であるアルカリ電池の断面図。

【図2】図1のアルカリ電池の端子兼容器の断面構造を示す図。

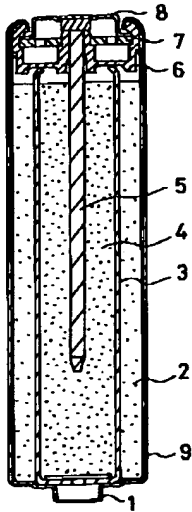
【符号の説明】

1…正極端子を兼ねる有底円筒形の金属缶、2…正極合剤、3…セパレータ、4…ゲル状負極、5…負極集電棒、6…絶縁ガスケット、7…リング状金属板、8…金

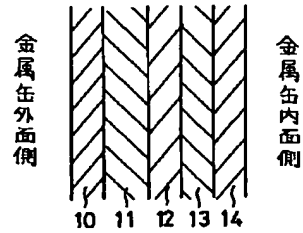
5  
 属封口板、9…ラベルジャケット、10、12…ニッケルメッキ層、11…銅板、13…ニッケルスズ合金メ

6  
 ッキ層、14…黒鉛を主成分とする導電膜層。

【図1】



【図2】



フロントページの続き

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